

## **Master of Science in Plant Biology**

### **Program code: 049020**

#### ***INTRODUCTION***

The Department of Biological Sciences (College of Science) offers a Master of Science program in **Plant Biology**. The program is designed to offer research opportunities in Cytogenetics and Chemical Mutations, the effect of the most common drugs on the process of mitosis and the chromosome structure, detection, identification and evaluation of the environmental mutagens and carcinogenesis, ecology, desert ecology, synecology to environmental factors, biotic influence, plant taxonomy, flora of arid regions and flora of Kuwait and the Gulf States. Plant physiology particularly the biochemistry of photosynthesis and related processes and the development and structure of chloroplasts. Only thesis option is offered.

*According to the University Council decision dated 4/2/2007, Thesis students admitted with effect from September 2007 are exempted from the comprehensive examination.*

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#### ***PROGRAM REQUIREMENTS***

##### **30 TOTAL COURSE CREDITS**

##### **9 COMPULSORY COURSES (credits in parenthesis)**

0480-585	Statistical Methods in Research	(3)
0494-501	Research Techniques	(3)
0494-502	Seminar	(1)
0494-503	Advanced Topics in Botany	(2)

##### **12 ELECTIVES COURSES\* (3 credits each)**

0494-526	Phytoplankton
0494-533	Developmental Genetics
0494-535	Molecular Plant Biology
0494-537	Pollution and Genotoxicity
0494-543	Plant Biotechnology
0494-545	Advanced Plant Breeding
0494-547	Advanced Plant Taxonomy
0494-564	Advanced Plant Ecology
0494-565	Stress Ecophysiology
0494-571	Plant Growth and Development
0494-573	Photobiology
0494-582	Plant Disease Management

\*The program students are allowed to take a total of not more than 6 credits from any 500 level courses offered by other graduate programs in the College of Graduate Studies. Only 3 credits are be allowed to be taken from 400-level courses offered in the College of Science with the approval of the Program Director.

## 9 COMPULSORY COURSES

0494-597	Thesis	(0)
0494-598	Thesis	(0)
2000-599	Thesis	(9)

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### ***COURSE DESCRIPTION***

#### **0494-501: RESEARCH TECHNIQUES CR: 3**

Exercises and demonstrations dealing with theoretical and practical aspects of modern techniques in different disciplines of plant biology.

#### **0494-502: SEMINAR CR: 1**

Reading and discussions of current literature and research. Seminars can be arranged to suit interests and demands of different sub disciplines.

#### **0494-503: ADVANCED TOPICS IN BOTANY CR: 2**

Detailed study and analysis of aspects of botany beyond those covered in regular classes. Topics vary from term depending on staff member's field of specialization.

#### **0494-526: PHYTOPLANKTON CR: 3**

Diversity of phytoplankton. Physical and chemical environment of phytoplankton. Physical ecology of phytoplankton. Phytoplankton populations. Phytoplankton physiology. Mechanisms of phytoplankton buoyancy. Nutrients uptake and assimilation in phytoplankton. Growth and mortality of phytoplankton.

#### **0494-533: DEVELOPMENTAL GENETICS CR: 3**

Regulation of gene expression in eukaryotes and prokaryotes – Genetic control of development in selected organisms (drosophila, plant and animal examples) – Genetic control of gametogenesis - Genetic analysis of cell cycle development - Programmed cell death and normal development.

#### **0494- 535: MOLECULAR PLANT BIOLOGY CR: 3**

Structural details of plant genomes such as nuclear. Chloroplast, mitochondria and disposable elements. Plant transformation. The genome of Arabidopsis. The molecular aspects of nitrogen fixation, development of flower and seed, and pest resistance. Application of genetic engineering in plants

#### **0494-537: POLLUTION AND GENOTOXICITY CR: 3**

Changes in eukaryotic gene expression in response to environmental stress. Methodology for detecting mutations and clastogenic effects at the molecular, cellular and entire organism levels. Mutagens in the environment. Genetic risk of atomic energy. Biological indicators of environmental pollution.

#### **0494-543: PLANT BIOTECHNOLOGY CR: 3**

The course emphasizes the use of molecular biology techniques to improve cultivated plants. It will address basic, and applied sciences and also taking into consideration the ethics and values.

#### **0494- 545: ADVANCED PLANT BREEDING CR: 3**

Importance, basics and updated biological concepts of plant breeding science. Essential requirements and tools. Major objectives and examples of classical breeding achievements. Developed molecular approaches and their applications in modern plant breeding . Emergency of recent topics associated with methodologies, economics, risks and constraints of new breeding strategies.

**0494-547:    ADVANCED PLANT TAXONOMY**  
**CR: 3**

Characters, taxa and species. Taxa and species concepts. The process of classification. Different sources for taxonomic information extracted from cytotaxonomy, chemotaxonomy, immunotaxonomy, and molecular biology. Identification and Classification using molecular methods.

**0494-564:    ADVANCED PLANT ECOLOGY**  
**CR: 3**

Major bio-mass of the world. Plant adaptations to different habitats. Interaction among plants and between plants and their physical environment. Properties of plant populations. Landscape ecology. Factors influencing the structure of plant communities. Ecology of desert ecosystems. Desert of Kuwait, habitat loss, biodiversity and conservation. Soils of Kuwait.

**0494-565:    STRESS ECOPHYSIOLOGY**  
**CR: 3**

Importance, definitions and types of stresses. Plant cell water relations. Regulation of cell growth under stress. Water deficits and the adjustment of photosynthetic carbon metabolism. Osmoregulation and stress hormones. Molecular bases of tolerance to abiotic stress. Research in stress ecophysiology and its link to modern improvements in physiology research techniques.

**0494-571:    PLANT GROWTH AND DEVELOPMENT**  
**CR: 3**

Physiology of growth and development of the different parts of the plant. The structure and metabolism of plant hormones. Integration of hormone signaling and floral induction.

**0494-573:    PHOTOBIOLOGY**  
**CR: 3**

Study of the interaction of light with plants. Physiology of photobiological processes. Nature of pigments and receptors involved. Environmental factors affecting photosynthesis and repair mechanisms in photo biological.

**0494-582:    PLANT DISEASE MANAGEMENT**  
**CR: 3**

Disease management as (a) an integral component of plant production and growth, and (b) a logical integration of pathogen biology with modern management technologies.

**0494-597:    THESIS**  
**CR: 0**

**0494-598:    THESIS**  
**CR: 0**

**2000-599:    THESIS**  
**CR: 9**